

Last Name (print) _____ First Name _____
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Exam2Sec1Fall2007

True/False

Indicate whether the statement is true or false.

- ___ 1. Because of the dissolved salt in seawater its freezing point is lower than that of pure water
- ___ 2. Short residence time elements are uniformly distributed in the oceans
- ___ 3. Salinity is used to determine the density of sea water
- ___ 4. Hydrothermal vents are found only at mid-ocean ridges.
- ___ 5. All of the nitrate in the ocean comes from rivers
- ___ 6. Tritium (^3H) was produced during the atmospheric testing of nuclear weapons
- ___ 7. The density of seawater is determined by temperature and salinity
- ___ 8. There are only two places in the ocean where deep water is currently made
- ___ 9. In the mid-latitudes $30\text{-}40^\circ$ there is more evaporation from the surface of the ocean than precipitation back into it
- ___ 10. Humid air is more dense than dry air
- ___ 11. Low pressure zones in the atmosphere occur where air is ascending
- ___ 12. Gyres in the Southern hemisphere are anticlockwise
- ___ 13. During El Nino conditions hurricanes are less likely to come near Hawaii
- ___ 14. El Nino is a very recent climatic event dating from 1970
- ___ 15. Wave packets travel at the same speed as individual waves
- ___ 16. The trough of a tsunami always arrives first
- ___ 17. Tides are created only as a result of gravitational attraction
- ___ 18. Average tidal range in Hawaii is 9 feet
- ___ 19. Methane is also a greenhouse gas
- ___ 20. Our current state of knowledge allows us to accurately predict the rise in sea level as atmospheric CO_2 levels increase

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 21. How much salt is dissolved in a kilogram of typical seawater
- 1 gram
 - 15 grams
 - 35 grams
 - 0.1 gram
- _____ 22. What is the approximate mixing time of the oceans?
- 100 years
 - 1,000 years
 - 36,000 years
 - 1 million years
- _____ 23. How much of the Earth's surface water is in the oceans?
- 10%
 - 97%
 - 99%
 - 73%
- _____ 24. Hydrothermal fluids do not boil at 380 °C at the bottom of the ocean because
- Pressure has raised the boiling point
 - Sea water doesn't boil
 - There are too many chemicals dissolved in the sea water
 - The particles prevent boiling
- _____ 25. The chemosynthetic based communities at hydrothermal vent sites get their energy ultimately from:
- Sulphide
 - Sunlight
 - Warmth of the water
 - Radioactive decay
 - Twinkie bars
- _____ 26. When sea water passes through a hydrothermal system
- Anhydrite (Ca SO₄) is precipitated
 - Magnesium (Mg) is removed by reaction with the rock.
 - Sulphate is reduced to sulphide.
 - All of the above.
- _____ 27. The 1% light level in the open ocean (say just north of Hawaii) is somewhere around
- 1 m
 - 60 m
 - 120 m
 - 200 m
- _____ 28. If a 100 units of organic matter are produced in the upper waters of the ocean on average how many units of this organic matter will fall through the water column reach the sea bed and be preserved in the sediments:
- less than 1
 - 90
 - 7-9
 - 0

- _____ 29. The pycnocline is the depth in the ocean where
- the temperature changes rapidly
 - the salinity changes rapidly
 - the density changes rapidly
 - sharks hang out waiting for surfers
- _____ 30. The heat capacity of a substance is the amount of heat needed to raise its temperature by
- 1°C
 - 10°C
 - 15°C
 - 100°C
- _____ 31. The SOFAR layer in the ocean is a region
- with maximum sound speed
 - with minimum sound speed
 - where submarines can hide from SONAR
 - where sound waves refract away from
- _____ 32. The colour of light that is absorbed least in the ocean is
- violet
 - blue
 - green
 - red
- _____ 33. The speed of light in water, compared to air is:
- greater
 - less
 - same
- _____ 34. The atmospheric pressure at the top of Mauna Kea is approximately
- 1000 mb
 - 829 mb
 - 562 mb
 - 213 mb
- _____ 35. The wavelength of the radiation entering and leaving the Earth are
- the same
 - incoming is short, outgoing is long
 - incoming is long, outgoing is short
 - none of the above
- _____ 36. At the equator the Earth is rotating eastward at approximately:
- 100 mph
 - 10,000 mph
 - 1,000 mph
 - 1,500 mph
- _____ 37. Western boundary currents are:
- faster than eastern boundary currents
 - warmer than eastern boundary currents
 - all of the above
 - none of the above

- _____ 38. The southern oscillation is:
- the change in direction of Coriolis force at the equator
 - the change in pressure differential between Darwin and Tahiti
 - the change in the thermocline depth between El Nino and La Nina
 - A popular dance from Brazil
- _____ 39. During the 1982/83 El Nino the weather conditions in Australia were:
- drought
 - heavy rainfall
 - hurricanes
 - unaffected
- _____ 40. In the movie clip about the 1982/3 El Nino we watched in class, where were the large waves washing away the foundations of houses
- | | |
|--------------|---------------|
| a. Tahiti | c. California |
| b. Australia | d. Washington |
- _____ 41. A wave behaves as a shallow water wave when the depth of the ocean is equal to or less than:
- one wavelength
 - 1/2 wavelength
 - 1/20 wavelength
 - 1/23 wavelength
- _____ 42. If a wind wave has a period of 8 seconds its velocity in meters per second in deep water would be approximately:
- 8
 - 12
 - 24
 - 210
- _____ 43. When wave trains propagate away from a storm they lose what percentage of their height each day?
- 10%
 - 50%
 - 30%
 - 22%
- _____ 44. The period of a wave is:
- the distance between its crests
 - the time it takes succeeding crests to pass a fixed point
 - the number of waves that pass a fixed point each second
 - the distance from the crest to the trough of a wave
- _____ 45. In the Pacific Ocean, Tsunami travel at approximately:
- 13 mph
 - 45 mph
 - 150 mph
 - 450 mph
- _____ 46. Spring tides occur when:
- the moon is one quarter
 - the Sun and Moon are aligned with the Earth
 - Jupiter is aligned with Mars
 - none of the above

- _____ 47. Conservative ions are:
- those whose proportions remain constant relative to each other in all oceans
 - those whose proportions vary relative to each other in all oceans.
 - those ions whose concentration is less than 1 mmol
 - those ions whose concentration is greater than 1 mmol
 - those ions that vote republican
- _____ 48. If you cool seawater its density
- increases
 - decreases
 - stays the same
- _____ 49. Of the total water in the ocean the deep zone accounts for about
- 1%
 - 18%
 - 80%
 - 99.4%
- _____ 50. The mass of one square inch of the atmosphere at the Earth's surface is approximately
- 5 pounds
 - 1 pound
 - 15 pounds
 - 25 pounds
 - 10 pounds
- _____ 51. During El Nino the layer of warm water at the surface ocean in the Western Pacific is
- thicker than normal
 - thinner than normal
 - stays the same
- _____ 52. The period of a wave is:
- the distance between its crests
 - the time it takes succeeding crests to pass a fixed point
 - the number of waves that pass a fixed point each second
 - the distance from the crest to the trough of a wave
- _____ 53. In the movie clip we saw in class, where were the very large waves?
- | | |
|-------------------|----------------------|
| a. Cape Horn | c. Cape of Good Hope |
| b. Cabo san Lucas | d. South of Iceland |
- _____ 54. As a result of tides the length of a day on Earth is:
- increasing
 - decreasing
 - not changing
- _____ 55. The tides in Hawaii are:
- diurnal
 - semi-diurnal
 - mixed
- _____ 56. The current CO₂ content of the atmosphere (in ppmv) is about:
- 120
 - 180
 - 380
 - 560

Name: _____

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- _____ 57. If we were to burn all the fossil fuels and all the organic carbon in sediments we could, in principle, increase atmospheric CO₂ levels by:
- a. 2-times
 - b. 6- times
 - c. 13- times
 - d. 20- times
 - e. 50- times
- _____ 58. During an ice age sea level
- a. goes up
 - b. goes down
 - c. stays the same
- _____ 59. Data from ice-cores shows that when carbon dioxide levels in the atmosphere went down, average planetary temperatures:
- a. stayed the same
 - b. went up
 - c. went down
- _____ 60. The Vostock ice core was drilled by French and Soviet scientists in
- a. France
 - b. Greenland
 - c. Siberia
 - d. Antarctica
 - e. Alaska

Completion

Complete each statement.

61. The Earth loses its heat by _____
62. Westerly winds travel towards the _____

Essay

63. Name 5 of the 6 major ions in seawater.

Name: _____

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64. Name four chemicals that are needed by all oceanic plants and two that are needed by some organisms that build skeletons

65. Draw a picture and name the principal currents in the North Pacific gyre